

Remarks

Claims 87-157 are pending.

Claims 87, 89-91, 96, 104-105, 108, 112-125, 128, 137, 139-140, 148-149 and 151-157 have been amended. No new matter is added with the amendments, which are intended to merely clarify language used in the claims and the subject matter claimed. The scope of the claims is intended to be the same after the amendment as it was before the amendment.

Rejection of Claims under 35 U.S.C. § 102(e) (Houle)

The Examiner rejected Claims 87-90, 108, 111, 122-123, 135-137, 140-141, 146-148, 149-151 and 154-157 under Section 102(e) as anticipated by US 2004/0095727 (Houle). This rejection is respectfully traversed.

In response to Applicant's arguments, the Examiner stated as follows (emphasis added):

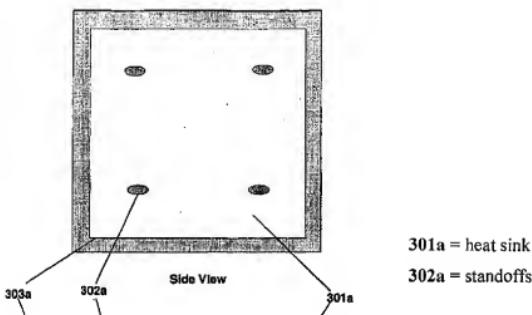
8. Applicant's arguments filed 11/13/06 have been fully considered but they are not persuasive. For instance, the Applicants argue that the cited reference, Houle, does not disclose the standoff is formed on the surface of the die. *Houle indeed discloses standoffs or spacers 302a directly formed on the backside of the die 304a....*

10. It is further noted that Houle indeed shows standoffs are formed on the surface of the die 304 in fig. 3A.

The Examiner is error.

Fig. 3a below is a side view of the heat sink 301a and the standoffs 302a.

The figure clearly shows the standoffs 302a attached to the heat sink 301a.



And Houle clearly states that the standoffs 302a are attached to the heat spreader 301a. See at paragraphs [0024], [0026] and [0027] (emphasis added).

[0024] A heat spreader, comprising a metal body with attached standoffs located approximately above the integrated circuit, is described. ...

[0026] FIG. 3a illustrates both a device-side view of a heat spreader 301a, and a cross-section of a semiconductor package 309a in accordance with an embodiment of the present invention. The heat spreader 301a has small standoffs 302a attached to the cavity-side surface...

The instant claims are method claims – which recite forming a standoff on a surface of a die, – or require a standoff formed on or attached to the die and exposed on the die.

– Houle does not teach forming standoffs on a die.

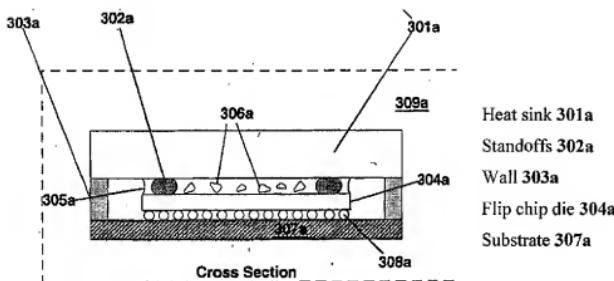
Houle teaches forming standoff 302a on a heat sink – not on a die.

– Additionally, Houle's standoffs 302a are positioned between die 304a and heat sink 301a.

The standoffs 302a are not exposed on the die.

The standoffs 302a are not positioned to contact a mold plate – e.g., as in Claims 154-157.

This is clearly shown below in the cross-section view.



The standoffs 302a in Houle's device are not exposed on the die 304a.

And – Houle mounts standoffs 302a on the heat sink 301a – as shown above (Fig. 3a sideview).

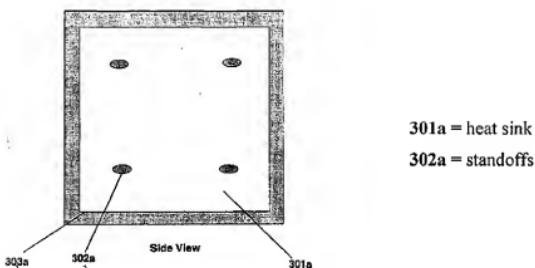
Furthermore, Houle's **Fig. 3A** is not identical to Applicant's device shown in **FIG. 1**.

The Examiner also stated as follows (emphasis added):

8.*For example, figure 3a of Houle is substantially identical with the current invention fig. 1, where the standoffs are formed on the back surface of the die.*

The Examiner has misinterpreted **Fig. 3a** of Houle.

Again, the side view of **Fig. 3a** clearly shows *standoffs 302a attached to the heat sink 301a.*



Houle does not form standoffs on the die.

Houle does not teach or suggest Applicant's methods as claimed – in which a standoff is *formed on* or attached to a surface of a die. Rather, Houle specifically teaches attaching standoffs *to a heat spreader* – and not to a die.

Accordingly, withdrawal of this rejection is respectfully requested.

Rejection of Claims under 35 U.S.C. §§ 102(b) (Chiu)

The Examiner maintained the rejection of Claims 87-90 and 92-94 under Section 102(b) as anticipated by US 2003/0183909 (Chiu). This rejection is respectfully traversed.

The Examiner maintains that Chiu discloses each of the elements recited in the claims, citing to FIGS. 4-6.

The Examiner *failed to respond* to Applicant's previous arguments.

It is again submitted that Chiu does not teach or suggest Applicant's method of fabricating a semiconductor device.

Chiu does not teach forming a "standoff" on a die.

Chiu teaches filling a gap 146 between a microelectronic device 102 and a heat dissipation device 124 that is situated over the device 102.

And the gap fill covers the entire back surface of the device 124 – as shown in Figs. 5, 7 below, and stated at paragraphs [0026] and [0029] (emphasis added):

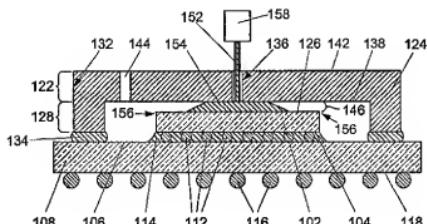


FIG. 5

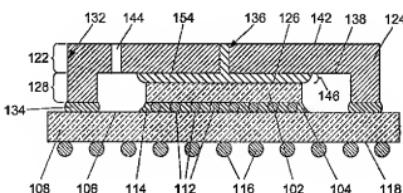


FIG. 7

[0026] A base portion 122 of a heat dissipation device 124 is disposed over a back surface 126 (generally opposing said microelectronic device active surface 104) of the microelectronic device 102....

[0029] The thermal interface material 154 is fed until into the gap 146 until it covers the entire microelectronic device back surface 126.

The claims recite a method in which the standoff(s) is exposed and formed on only part of the die surface.

Chiu does not teach or suggest Applicant's methods as claimed. Rather, Chiu teaches a gap fill material 154 covering the entire surface 126 of a device 102.

Accordingly, withdrawal of this rejection is respectfully requested.

Rejection of Claims under 35 USC § 103(a) (Houle)

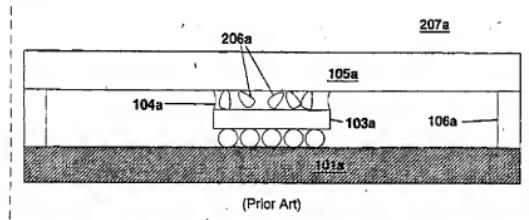
The Examiner rejected Claims 109-110 and 138-139 under Section 103(a) as obvious over Houle. This rejection is respectfully traversed.

In response to Applicant's arguments, the Examiner stated as follows (emphasis added):

9. Applicants further argue that the Houle does not disclose that the standoffs are formed in a form of an enclosure with heatsink material formed within. Again, figure 2A shows the cross section of the device where standoffs are on the sides and other materials are formed inside. This figure suggests that the standoffs indeed are formed in an enclosure form and heatsink material is formed inside.

The Examiner's statement is in error.

Figure 2a is shown below.



The walls **106a** *enclose the die* **103a** – not the heat sink **105a**.

As clearly shown – *a flip chip die* **103a** is positioned between the walls **106a**.

The *heat sink* **105a** is mounted on top of the walls **106a**.

Houle does not teach or suggest a standoff structure as an *enclosure* – and a *heat sink material* within the standoff enclosure. Accordingly, withdrawal of this rejection is respectfully requested.

Rejection of Claims under 35 USC § 103(a) (Houle with Dolbear)

The Examiner maintained the rejection of Claims 92-95, 104, 125-127 and 134 under Section 103(a) as obvious over Houle in view of USP 5,926,371 (Dolbear). This rejection is respectfully traversed.

The Examiner cites Dolbear as teaching standoffs 58a-58c composed of epoxy adhesive, resin or plastic dispensed by molding injection, etc., citing particularly to Fig. 3 and col. 11, line 58 to col. 12, line 20.

The added disclosure of Dolbear does not correct the deficiencies in Houle in teaching or suggesting Applicant's method as claimed.

Houle, either alone or combined with Dolbear, does not teach or suggest Applicant's methods as claimed. Accordingly, withdrawal of this rejection is respectfully requested.

Rejection of Claims under 35 USC § 103(a) (Houle with Sylvester)

The Examiner maintained the rejection of Claims 142-145 under Section 103(a) as obvious over Houle in view of USP 6,847,527 (Sylvester). This rejection is respectfully traversed.

The Examiner cites to Sylvester as teaching a substrate analogous to the materials recited in the claims – i.e., a polyimide film or a rigid material (a polymer material, ceramic material, metal clad fiber board, metal leadframe), stating that it would be obvious to use such materials in Houle's device. The Examiner cites particularly to substrate 58 of Sylvester, and also the entire col. 5.

As discussed above, Houle specifically teaches attaching standoffs *to a heat spreader*. The added disclosure of Sylvester does not correct the deficiencies in Houle in teaching or suggesting Applicant's method as claimed.

Accordingly, withdrawal of this rejection is respectfully requested.

Extension of Term. The proceedings herein are for a patent application and the provisions of 37 CFR § 1.136 apply. Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that Applicant has inadvertently overlooked the need for a petition for extension of time. If any extension and/or fee are required, please charge Account No. 23-2053.

It is submitted that the present claims are in condition for allowance, and notification to that effect is respectfully requested.

Respectfully submitted,



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Dated: March 30, 2007

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